

Isolation and analysis of bacteria adapted to degrade humic-sorbed polynuclear aromatic hydrocarbons (PAH). (S03-hickey889986-oral)

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Abstract:

Our objective was to determine if bacteria adapt to degrade PAH sorbed to humic compounds, and if so identify the nature of the adaptations that may facilitate this activity. Concentrated solutions of humic acid, which solubilize hydrophobic organic compounds, were the model sorbent. Our hypothesis was that sorption of a PAH (phenanthrene) by humic acids in these solutions would create a bioavailability barrier to phenanthrene-degraders, and overcoming this barrier would require microbial adaptation. PAH-contaminated soil was inoculated into a mineral salt medium containing either humic acid-sorbed phenanthrene (HASP), non-sorbed phenanthrene (NSP) in which the PAH was added as crystals to a mineral medium, or humic acids only (HA). From the NSP cultures, 25 strains of PAH-degraders were isolated that represented a diversity of Gram-negative and Gram-positive bacteria. Four closely-related *Burkholderia* sp. strains were isolated from the HASP cultures, while the HA enrichment yielded three different phenanthrene-degraders. Of this group, the only isolates with competence to grow on and mineralize HASP were those originating from HASP enrichments. An adaptation associated with HASP degradation competence was alteration of phospholipid fatty acid content, suggesting that alteration of membrane structure facilitated PAH uptake and/or interaction with the humic acid.

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